

## REDESCRIPTIONS OF TWO CHINESE *CUORA* (REPTILIA: TESTUDINES: EMYDIDAE)

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*Abstract.*—Validity of the turtle *Cuora pani* Song, 1984, from Shaanxi Province, China, which has become available to American and European scientists via the pet trade, has been questioned. It has been confused with *Cuora yunnanensis* Boulenger, 1906, a poorly known species not seen since the type series was collected from two highland sites in Yunnan Province, China. Major differences exist, and the two species are redescribed and illustrated.

In the last year several taxa of Chinese box turtles, family Emydidae, have become available to the scientific community of North America and Europe through the pet trade. These turtles have all been mistakenly referred to as *Cuora yunnanensis* (Boulenger 1906), a highland species from Yunnan Province, China, and one that has not been collected since the type series. Most of the imported turtles are the recently named, but poorly described *Cuora pani* Song, 1984. The original descriptions of both *C. yunnanensis* and *C. pani* are vague and suggest many similarities that do not exist. *Cuora pani* was described in Chinese with a brief English summary, thus contributing to the confusion of non-Chinese readers. To clearly differentiate these two taxa, I offer the following descriptions and illustrations.

*Methods and materials.*—Straight-line measurements of each specimen were taken with dial calipers accurate to 0.1 mm of the greatest carapace length, carapace width and depth of the level of the seam between vertebrals 2 and 3, marginal width (the difference between the carapacial width and the width across the pleurals taken between the points of juncture of the marginals and pleurals at the level of the seam between vertebrals 2 and 3), greatest plastron length, greatest width and length of both plastral lobes, greatest bridge length, greatest width and length of vertebrals 1 and 2 and pleural

2, and the medial seam length and greatest width of all plastral scutes. Careful notes and drawings were made of head, neck, limb, carapacial, plastral, and bridge patterns. Colors were recorded from living turtles and color transparencies. Shell proportions are expressed as ratios of one measurement to another. Sixteen ratios proved useful (abbreviations used in the text are given in parentheses): width/length of cervical scute (W/L CS), width/length of first vertebral (W/L 1st V), width/length of second vertebral (W/L 2nd V), width/length of second pleural (W/L 2nd Pl), marginal width/carapacial width (MW/CW), marginal width/carapacial length (MW/CL), carapacial width/carapacial length (CW/CL), carapacial depth/carapacial length (D/CL), carapace depth/carapacial width (D/CW), plastral length/carapacial length (PL/CL), bridge length/plastral length (B/PL), bridge length/carapacial length (B/CL), length of anterior plastral lobe/plastral length (APL/PL), width of anterior plastral lobe/plastral length (APW/PL), length of posterior plastral lobe/plastral length (PPL/PL), and width of posterior plastral lobe/plastral length (PPW/PL). The number of rows of large scales at the lateral edge of the antibrachium between the claw of digit V and the first horizontal skin fold proximal to the elbow (presented in text as foreleg scale rows) was recorded.

Specimens from the following collections

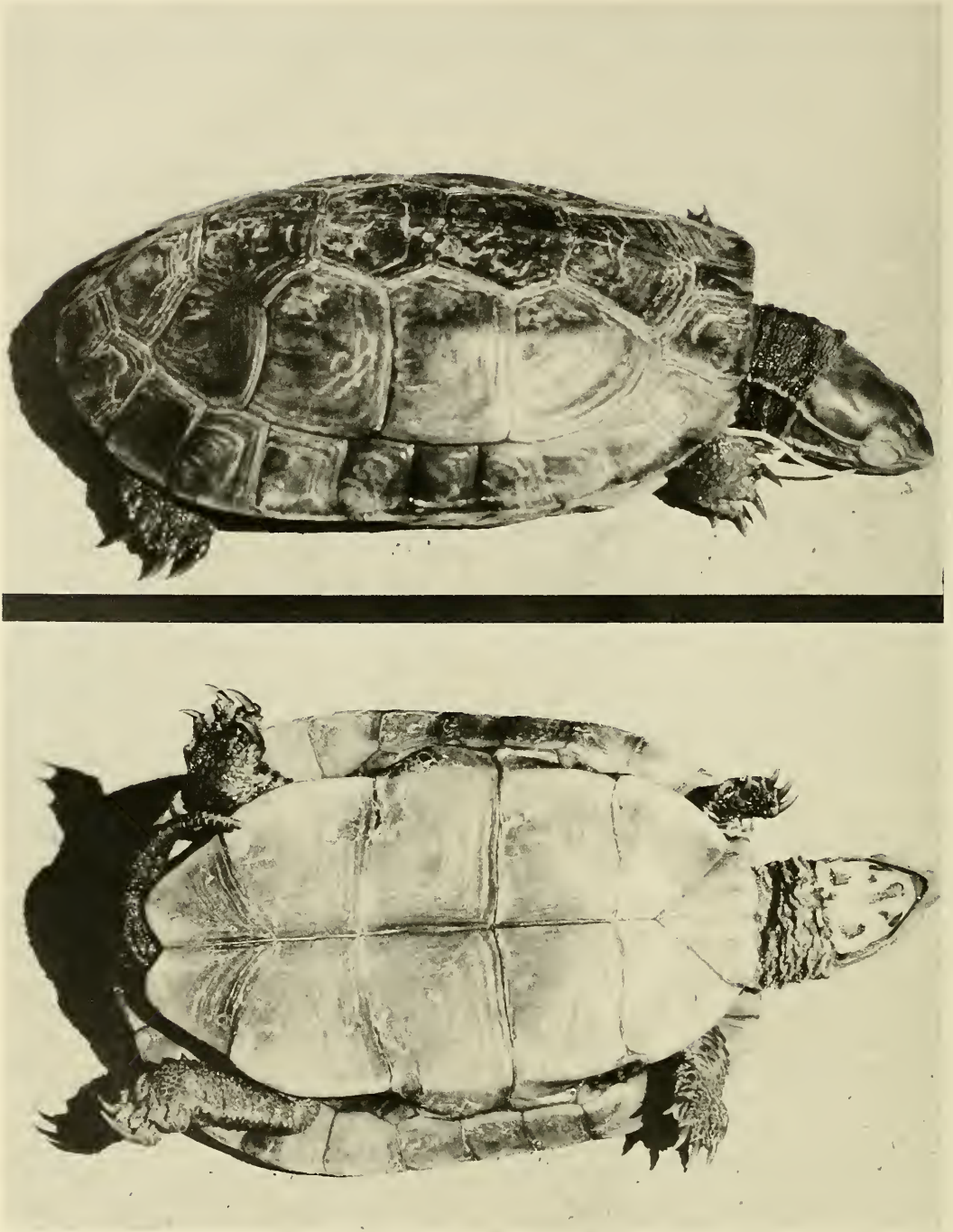


Fig. 1. Carapace and plastron of *Cuora yunnanensis*.



were examined (abbreviations used in the text are given in parentheses): British Museum of Natural History (BMNH), William H. Randel, Hatboro, Pennsylvania, personal collection (WHR), National Museum of Natural History, Smithsonian Institution (USNM).

*Cuora yunnanensis* (Boulenger, 1906)  
Figs. 1, 2

*Cyclemys yunnanensis* Boulenger, 1906:567.  
*Cuora yunnanensis* Smith, 1931:88.

*Syntypes*.—BMNH 1946.1.22.97 (female) from Tongchuan Fu, Yunnan Province, China, and 1946.1.22.98–99, 1946.1.23.1–3 (4 males, 1 female) from Yunnan Fu, Yunnan Province, China; John Graham.

*Specimens examined*.—BMNH 1946.1.-22.1–3; 1946.1.23.98–99.

*Diagnosis*.—A brown species of *Cuora* with a flattened, tricarinate carapace, a posteriorly notched plastron with a complete interanal seam, the plastral seams narrowly marked with dark pigment, brown skin, a light postorbital stripe, and large yellow or orange blotches on the chin and throat.

*Description*.—Carapace length to 140 mm (males 126, females 140, measurements of largest specimen taken from Boulenger 1906), elliptical, flattened (D/CL, 0.33–0.39,  $\bar{x}$  = 0.352; D/CW, 0.49–0.51,  $\bar{x}$  = 0.502; CW/CL 0.65–0.77,  $\bar{x}$  = 0.704); widest at level of marginals 8–9, highest at posterior of vertebral 3 (posterior of vertebral 2 in one specimen). Sides straight with no indentation at the bridge. Marginals flared, those most posterior slightly serrated, the first anterior marginals widest, and those over the bridge narrowest (MW 11.0–16.6 mm,  $\bar{x}$  = 13.2; MW/CW 0.18–0.215,  $\bar{x}$  = 0.202; MW/CL, 0.13–0.17,  $\bar{x}$  = 0.143). There is a slight notch between the twelfth marginals. Cervical scute longer than wide (W/L CS 0.76–0.89,  $\bar{x}$  = 0.79). Each vertebral scute wider than long, but much nar-

rower than the pleural scutes. The first and fifth vertebrals are flared, but the first does not extend to the seams separating marginals 1 and 2 on each side. General texture of carapacial scutes smooth in older individuals, but granulated with low, rounded rugosities in those up to 88 mm CL. Three longitudinal keels are present; that extending medially along the vertebrals is highest, while the lateral two, which extend along the dorsal third of the pleural scutes on each side, are lower and may be almost nonexistent in larger individuals. Carapace in preserved specimens is olive-brown to chestnut-brown with narrow black seams and some yellow along the pleural-marginal border.

Plastral length to 115.5 mm (males 115.5, females 62.4, but largest female reported by Boulenger (1906) not examined). PL/CL 0.92–0.94,  $\bar{x}$  = 0.928; hinged between the pectoral and abdominal scutes, slightly upturned anteriorly and posteriorly notched. The posterior plastral lobe is longer and wider than the anterior lobe (APL/PL 0.42–0.45;  $\bar{x}$  = 0.438; PPL/PL 0.56–0.58,  $\bar{x}$  = 0.568; APW/PL 0.45–0.49;  $\bar{x}$  = 0.480; PPW/PL 0.51–0.54,  $\bar{x}$  = 0.526). Lateral margins of the femoral and anal scutes curved gradually toward the midline. Bridge moderate in length with a small axillary and a small inguinal scale; B/PL 0.28–0.31,  $\bar{x}$  = 0.297; B/CL 0.26–0.29,  $\bar{x}$  = 0.276. The average plastral formula is Abd. > Pect. > An. > Gul. > Fem. > Hum. The interanal seam is complete. Plastron light brown with dark brown or black seams. A dark bar is present on the bridge, and the undersides of the marginals are yellow with dark seams and some faded dark pigment.

The head is narrow, the snout pointed and only slightly projecting, and the upper jaw is slightly hooked. Coloration is olive to brown. A narrow yellow black-bordered stripe extends backward from the eye above the tympanum and onto the neck, and a second, similar stripe extends posteriorly from the corner of the mouth, passes below



Fig. 2. Head of *Cuora yunnanensis*.



the tympanum and onto the neck. The chin and throat are marked with large yellow to orange blotches. The jaws are yellow to tan. The neck is brown with two narrow yellow or orange, black-bordered, longitudinal stripes on each side.

The digits are fully webbed. The forelegs are brown with longitudinal stripes of yellow or orange spots. There are several large, band-like, transverse scales on the anterior surface of each foreleg; foreleg scale rows 9–11,  $\bar{x} = 10$ . The hindlegs are brown with a narrow outer fringe of small yellow scales. The tail is brown with two black-bordered, yellow dorsal stripes.

Males have concave plastra, and longer tails with the vent beyond the carapacial rim; females have flat plastra and shorter tails with the vent beneath the posterior marginals. The female carapace is more domed than that of the male.

*Cuora pani* Song 1984

Fig. 3

*Holotype*.—Shaanxi Institute of Zoology 80170 (adult male); *Allotype*.—SIZ 80171 (adult female), both from Xujiaba, Shaanxi Province, China; 17 Jun 1981, Song Ming-Tao.

*Specimens examined*.—WHR 1–11 (live; 5 males, 6 females) USNM 4 males).

*Diagnosis*.—A species of *Cuora* with reddish-brown vertebrals on an olive to dark brown, carinate carapace, a posteriorly notched plastron with a complete inter-anal seam, a plastral pattern of large, often separated, black blotches, yellow skin, a yellow postorbital stripe, and an unmarked chin and throat.

*Description*.—Carapace length to 156.5 mm (males 120 from Song 1984; females 156.5), oval, flattened. (D/CL 0.30–0.39,  $\bar{x} = 0.352$ ; D/CW, 0.35–0.50,  $\bar{x} = 0.467$ ; CW/CL 0.64–0.79,  $\bar{x} = 0.729$ ); widest at level of marginal 8, highest near seam separating vertebrals 2 and 3. Sides straight with no indentation at the bridge. Marginals

flared, those most posterior slightly serrated, the first anterior marginals widest, those along the sides may be slightly upturned (MW 9.2–18.8 mm,  $\bar{x} = 12.7$ ; MW/CW 0.16–0.24,  $\bar{x} = 0.197$ ; MW/CL 0.12–0.17,  $\bar{x} = 0.143$ ). There is a slight notch between the twelfth marginals. Cervical scute longer than wide (W/L CS 0.35–0.91,  $\bar{x} = 0.710$ ). Each vertebral scute wider than long, but narrower than the pleural scutes. The first and fifth vertebrals are flared. General texture of the carapacial scutes smooth in older individuals, but granulated with low, rounded rugosities in those to 84 mm CL. A low keel extends medially along the vertebrals; no lateral keels are present. Carapace in live individuals is olive-brown with chestnut-brown to reddish-brown pigment on the vertebrals, and occasionally as spots on the pleurals, and with a narrow yellow rim.

Plastral length to 146.5 mm (males 84.0, but PL not reported for large male in Song 1984; females 146.5); PL/CL 0.91–0.97,  $\bar{x} = 0.932$ ; hinged between the pectoral and abdominal scutes, slightly upturned anteriorly and notched posteriorly. The posterior plastral lobe is longer and wider than the anterior lobe (APL/PL 0.40–0.46,  $\bar{x} = 0.423$ ; PPL/PL 0.54–0.58,  $\bar{x} = 0.560$ ; APW/PL 0.48–0.54,  $\bar{x} = 0.502$ ; PPW/PL 0.51–0.60,  $\bar{x} = 0.551$ ). Lateral margins of the femoral and anal scutes curve gradually toward the midline. Bridge moderate in length with a small axillary and a small inguinal scale; B/PL 0.27–0.35,  $\bar{x} = 0.311$ ; B/CL 0.25–0.34,  $\bar{x} = 0.290$ . The average plastral formula is An. > Pect. > Abd. > Gul. > Fem. > Hum., but much variation exists in the 15 specimens examined, 4 had the average formula, 5 were An. > Abd. > Pect. > Gul. > Hum. > Fem.; 3 each were An. > Abd. > Pect. > Gul. > Fem. > Hum. and Pect. > An. > Abd. > Gul. > Fem. > Hum. The interanal seam is complete. Plastron yellow with large, triangular-shaped black blotches which may touch, but are often separated. A black bar is present on the bridge, and

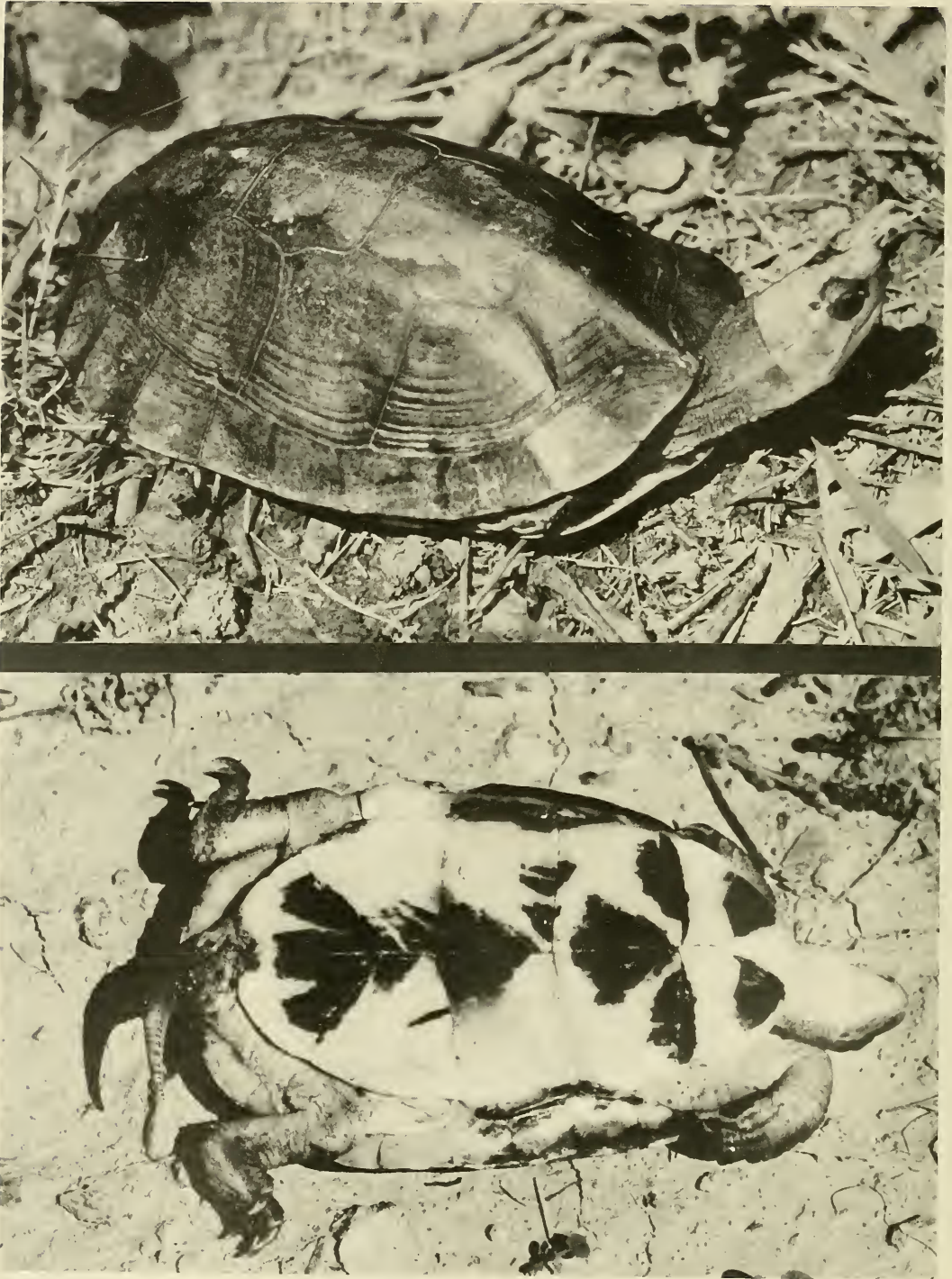


Fig. 3. Carapace and plastron of *Cuora pani*.



the undersides of the marginals are yellow, with some black pigment on those at the bridge.

The head is narrow, the snout is pointed but nonprojecting, and the upper jaw is slightly hooked. Coloration is lemon-yellow. A narrow, black-bordered stripe extends posteriorly from the eye onto the neck, and a second similar stripe runs backward from the corner of the mouth through the tympanum and onto the neck. Both of these stripes almost disappear in older individuals. The iris in life is greenish-yellow. The jaws, chin and throat are immaculate yellow. The neck is greenish-yellow dorsally and laterally, but yellow ventrally; narrow often broken, yellow stripes may occur on the sides or dorsal surface.

The digits are fully webbed. The limbs are olive on the outer surface but yellow to orange beneath. There are several large, band-like, transverse scales on the anterior surface of each foreleg; foreleg scale rows 10–15,  $\bar{x} = 11.7$ . The tail is olive with two black-bordered, yellow-dorsal stripes.

Sexual dimorphism as in *C. yunnanensis*.

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